具有進口台階之氣輪機第一級靜葉片端壁區域之流暢觀察

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摘 要

氣輪機常被用來提供每天尖峰負載時間所需額外的電力，此乃由於它的啟動時間比蒸氣輪機短很多。對這些經常起降的氣輪機，第一級靜葉片之損壞經常比預期壽命提早甚多，其原因未被徹底瞭解。 諸多研究學者已指出，靠近靜葉片端壁處之流場為極複雜的三維流，含有馬蹄形渦漩，通道渦漩，橫向流，壁渦漩及角落渦漩等二次流及其交互作用，而這些渦漩之形成，與上游邊界層之發展有密切的關係。忽略進口台階可能性的設計，顯然並不恰當。 本研究是以實驗方法探討氣輪機第一級靜葉片近端壁區域之三維流場。實驗採用多重煙線配合光頁的方法分別觀察有無進口台階發生時，靜葉片端壁附近之流場結構。 結果顯示，當進口為平滑端壁時(亦即無進口台階時)，所得流場結構與文獻紀錄。當有前向或背向進口台階時，在台階後方端壁上產生流動再接觸，再接觸點離台階前緣之距離以及其間的迴旋流區域從壓力面至吸力面有明顯的增大。此流動方向之再接觸流與橫向壓力梯度之綜合影響，在迴旋流區域內造成流體的攪拌作用，使得通道渦漩系統提早形成，並造成吸力面尾端的通道渦漩尺寸明顯變大。

關鍵詞 : 靜葉片，端壁區域，進口台階，多重煙線，三維流場。

目錄

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